



Hybrid Attendance Management System with Quick Response

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Abstract—Nowadays, the attendance of students is an important aspect from the institute's point of view. As per the university guidelines, it is important to have a minimum attendance of 75 % throughout the semester/year. So, if the attendance of the student is marked as his/her absence, then this leads to the proxy attendance scenario, and this affects the overall result of the student. Also, taking attendance physically in a class with a large number of students is a very tedious job for a teacher. So, to reduce the efforts of the teacher and to carry out smooth attendance, avoiding proxy, we have proposed a HYBRID ATTENDANCE MANAGEMENT SYSTEM WITH QUICK RESPONSE. In this, the teacher will generate the Quick Response(QR) and students will scan it. The Quick Response will be active for a limited time interval. To confirm that a student is scanning the Quick Response(QR) from the class, we have used the latitudinal and longitudinal theory. If the location of the student and the latitudinal + longitudinal degree's position match, then only the attendance will be marked, else it will be ignored. If a student does not have a smartphone for scanning the Quick Response(QR), we have proposed the theory of random number validation if it matches the number generated by the teacher for the same. The below represents all the details about the project. In the current scenario, in most colleges and schools, attendance is taken traditionally by using paper, which leads to the wastage of paper as well as time.

Index Terms—guideline, proxy attendance, Quick Response(QR), hybrid, random number authentication

I. INTRODUCTION

Currently, the Quick Response (QR) Code is a trending firm used in most aspects of life. Be it paying money, booking a movie ticket, retrieving information, shopping, ordering food at restaurants, books, magazines, and many more. Taking this trending firm into consideration, we have developed a HYBRID ATTENDANCE SYSTEM USING QUICK RESPONSE. The basic idea behind implementing this is to maintain clean attendance of students as well as ease in evaluating monthly attendance using pie charts. It has three levels, which are Student level, Teacher level, and Admin level, so that all the students will have access to only his/her particular profile, a teacher will have access to all students and the admin will have access to the teacher's profile as well as student's profile to check their monthly attendance. The Quick Response code generated by a teacher will be scanned by the students within 30 sec. of the period. To ensure security, we have introduced the latitudinal and longitudinal degree for the location of the student. If the student's position and degree are matched with their desired radius then only

student attendance will be marked successfully and stored in the database else it will be detained back. Some students might not have cell phones for scanning the QR, so in this case, we have used random number generation theory where a random number works as an authentication token and will be generated using the function, and students have to enter that particular number only, if it is entered correctly, then attendance will be marked. The overall monthly attendance will be represented graphically.

II. LITERATURE REVIEW

There are various proposals for automatic attendance systems. Majority of the attendance systems concentrate on installing software on the lecturer's device, whether it be a laptop or a smartphone. We have briefly discussed some of the proposals. Reference[1] Class attendance has a positive effect on learning performance and is essential to education management. The traditional headcount process wastes time and could be spent on class learning, especially in a large classroom. QR Class allows students to register their attendance via QR Code. The system uses Web services and Firebase to support its operations. Reference [2] and reference[6] follow the same approach as both are smartphone dependent. The fingerprint and Qr combination make attendance marking more secure and fast as the fingerprint module can act as an authentication layer as well as provide security and the QR code provides a fast and quick marking of attendance. Reference [3] High attendance of students indicates that the quality of school is good. This factor is very important. In concern with United States education society students are allowed to take education in whichever place they want it might be their home itself where tutors go and teach them. But in India it is not like United states students have to travel and go to school. So on the way they might come across lot of difficulties like kidnapping or sexual harassment. In order to avoid this idea of Location tracker of students is great where parents would be able to see the child where ever he goes. Also a SMS Alert would be sent to their parents. This will ensure the security of students. Bunking of lectures could be avoided. For this module we will need lithium battery, Global Positioning System module, arduino. Tracker will update the location as described by the user it might be 5 seconds or 10 seconds depending on the need. Once the data is achieved the mean would be calculated and then accordingly the attendance of the student will be

marked along with location tracker. Reference[4]As the traditional methods of attending are slow and time consuming and increase the risk of fake attendance, which is overcome by the attendance with Qr code.Teachers are searching for approaches to upgrade the educational process utilising the most recent technologies. It has been proposed an approach to computerise this cycle utilising students' computerised gadgets instead of teacher's gadgets. As such, the teacher needs to do nothing extra during the class past introducing the slides of the subject. Reference[5] This research reports attendance recording by QR code via smartphone. The average is 3.76 (S.D.=0.48) which means very satisfied. The data were recorded correctly (as the average of the highest satisfaction rate). Researchers plan to improve the system in order to be used in other classes.QR Class allows students to register their attendance via QR Code. The traditional headcount process wastes time and could be spent on class learning, especially in a large classroom. Researchers plan to improve the system in order to be used in other classes. The data were recorded correctly (as the average of the highest satisfaction rate). Reference[7]A proposed system that incorporates QR codes and devices connected to the internet in student attendance. This affordable QR code based attendance system enables lecturers to speed up the process of recording attendance. The acceptance of QR codes by students and educators is critical to successful implementation. Reference[8]International mobile equipment identity number is the unique key which is assigned to every mobile phone to ensure the safety of the mobile and track the location. Using IMEI concept the attendance of the student can be marked very accurately because the IMEI Number is in direct connection with the satellite and with this advantage, the exact position of the student will be achieved. If the position of the student matches the position of the school then only attendance will be marked otherwise it will be detained. This is a perfect location tracker for marking the attendance. The QR will be generated by staff in every lecture for the student and it will be scanned by the student. If the location is matched then attendance will be Marked. Reference[9] An application for marking the attendance is also considered to be perfect.The user first has to register to the app. The admin will then verify his details and send a unique code.This unique id is very important because it is the base for generating the Quick response code.After registration and verification, whenever the user logs, the Quick response code will be generated and scanned this will take location in consideration and time of presence factor also. The most proposals involve softwares being used by the instructor during class. If the attendance system needs some action from the instructor, then the entire class time will be disturbed every time the instructor allows any late students to enter the class. In our proposal the instructor does not need to do anything like this. The instructor just needs to present the slides of the course to the students. Students can register their presence anytime during the entire class period.

III. METHODOLOGY

This project involves 2 different logins, one for the teacher who is the Quick Response(QR) code creator and the student

who is going to scan it for his/her attendance. The precondition involves the student registering and logging himself/herself in for the marking of the attendance, the same way the teacher also needs to register and log in to their account for generating Quick Response(QR) codes to take attendance. When the student is attending a particular lecture, the teacher generates the Quick Response(QR) code of that particular subject with the time stamp and necessary details. The connection would be made with the computed Quick Response(QR) code which would be displayed on the projector screen or any display. After that, the students present in the class have to scan the generated Quick Response(QR) code from the particular display. The Quick Response(QR)code scanned by the student is verified and has to pass the necessary conditions and criteria to mark attendance by scanning the Quick Response(QR) code generated by the teacher. On successful verification, a time stamp is generated and the names of the students will be entered into the database as a marking to denote the interaction has taken place and attendance has been marked. The registered ID from the database for individual login and encrypted code in Quick Response(QR) image all make the part of the data being exchanged in the Quick Response(QR) code technique. If the student is unable to scan the Quick Response(QR) code, the teacher will provide a randomly generated number which will act as an OTP(one-time password) that the student needs to submit so that his/her attendance is recorded.

To ensure security, we have introduced the latitudinal and longitudinal degrees for the location of the student. If the student's position and degree are matched with their desired radius then only student attendance will be marked successfully and stored in the database else it will be detained back. Some students might not have cell phones for scanning the Quick Response(QR), so in this case, we have used random number generation theory where a random number works as an authentication token and will be generated using the function, and students have to enter that particular number only if it is entered correctly, then attendance will be marked. The overall monthly attendance will be represented graphically.

A. Hybrid Attendance Management System With Quick Response Framework Workflow

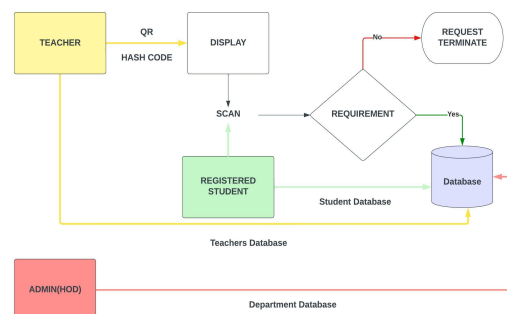


Fig. 1. Shows the workflow of Hybrid Attendance Management System With Quick Response

Fig 1 shows the frame work of this system which involves two different logins and 3 databases where all the data is stored and retrieved. one of the two different login the one is for Quick Response(QR) generator that is the teacher, and the other for the Quick Response(QR) scanner that is the students. Both the accounts one of generator and the other one of scanner is communicate with each other which is hosted on web portal.

When the Application is opened for the first time, the first step is the registration process which involves getting user details like name, mobile number, and other mandatory details. There are different login and registration for students as well as for teachers.

An administrator in the attendance application will do verification of the details submitted through the login to ensure that it is used by the authenticated user and able to edit roles and update details which are only edited by the administrator after the initial process of the registration and creating a profile. This ID will be used for scanning the generating Quick Response(QR) code to mark the attendance.

The approved logins, which are always checked for approval status from the database every time they log in, will be ready to process attendance registration. The Quick Response(QR) code can be generated by the teacher for the particular lecture and the student is ready to scan and respond to the database.

To get the attendance process started, the teacher creates a Quick Response(QR) code for that particular lecture with the help of the details stored in the database and uses the current timestamp and location for the authentication process. And with the help of all the required data, the Quick Response(QR) code is generated and then displayed on the display screen, which is then ready to be scanned by the student for marking their attendance.

To store the attendance. The teachers create or generate the Quick Response(QR) code on the particular subject data in the database of the teacher with the help of, subject ID, college name, current timestamp, and current location of the teacher. It is then used for creating the Quick Response(QR) code the QR code is created using the above data, then it is ready for the display on the screen to be scanned by the student to mark the attendance.

The duration of the Quick Response(QR) code is dependent on of starting and ending of the session when the teacher starts his/her lecture. A Quick Response(QR) code is generated and at the end of the lecture, the Quick Response(QR) code is set to invalid as the session ends.

when the Quick Response(QR) code is generated and displayed on the screen, then the student uses their device to scan the Quick Response(QR) code, then the Quick Response(QR) code is decrypted and the data of the student is checked and verified if the current location of the student is in the range of 50 meters from the location from where the Quick Response(QR) is generated .and the name of the college which is taken while the registration of the student and teacher matches then the attendance of the student is marked and updated in the database.

If the location is not in the required range from the location from which the Quick Response(QR) is generated, then the

request to mark the attendance is rejected and the attendance is not marked.

Similarly, for more authentication, if the college name of the teacher is not the same as that of the student, and the request for marking the attendance is rejected, it will help as a two-factor verification while marking the attendance.

It will also help with monitoring the duration of the interaction of the lecture. It is an optional feature. where the session start time and end time could be recorded by the time of the creation of the QR code and the time of deactivating the Quick Response(QR) code after the session ends, which helps administrators to monitor the season of the lectures taken by teachers.

Here, if any student is not able to scan a Quick Response(QR) code as there should be an error at the time of scanning, as an alternative way, we have introduced random number authentication with the help of which the student can mark the attendance as it is a random number it is valid only for 2 min from the time of creation as to decrease the risk of fake attendance or proxy which will act as an OTP(one-time password) for marking attendance.

As the attendance is marked by the student, then the data is updated on both databases. The teacher who generates the Quick Response(QR) code is filled with the data on students who have scanned the Quick Response(QR) code, which is added to the particular field of the database similar to the student who has scanned the Quick Response(QR) code, is filled with the name of the subject and the timestamp of the lecture which will help in Various statistics information that can be generated by reports, which can be perused.

B. System Architecture

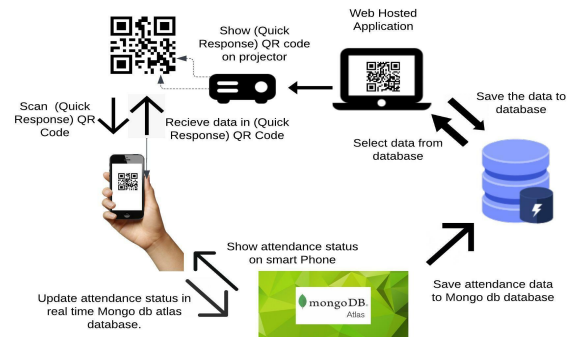


Fig. 2. Shows the System Architecture of Hybrid Attendance Management System With Quick Response

The above figure shows the System Architecture of a Hybrid Attendance Management System With Quick Response

This architecture follows 6 steps. The architecture starts with the web-hosted application and ends when the data that is stored in the database when a successful transaction happens between the generation of the Quick Response(QR) code, scanning, and storing all the data in the database

The step-wise explanation is as follows.

Step[1] In this step the teacher has to take and mark the attendance of the student with the help of generating the Quick

Response(QR) code. The teacher will select the subject which will help to store the attendance of the student for each subject and particular lecture after that a unique Quick Response(QR) code will be generated for that particular subject every time. That Quick Response(QR) code will be unique and only valid for a particular amount of time after that the Quick Response(QR) code will be set to invalid.

step[2] after step 1 that is generating the Quick Response(QR) code the next step is to display the Quick Response(QR) code this unique Generated Quick Response(QR) code that will be displayed on the projector in the class by this step the efficiency and speed of marking the attendance will increase.

step[3] After displaying the Quick Response(QR) code To mark the attendance, the student has to scan the Quick Response(QR) code this unique Quick Response(QR) code while scanning the Quick Response(QR) code. If the student fulfills the basic criteria to mark the attendance, then the attendance of the student will be marked, otherwise, the request to mark the attendants will be rejected. The basic criteria to mark attendance is the student should belong to a particular college and the location that is longitude and latitude of the student should be in the range of a particular radius from the location the Quick Response(QR) code is generated by the teacher. If the student is outside a particular radius and does not belong to the same college, then the student will not be able to mark attendance. After all these criteria, once the Quick Response(QR) code is scanned, then the attendance of that particular (registered) student will be marked. Due to this process, the problem of proxies can be avoided.

step[4] When the generation Quick Response(QR) code by the teacher and successful scanning process of the Quick Response(QR) code is achieved then the post request will be sent to the database that is MongoDB which is a non-relational database which will store all the data of attendance.

step[5]The data in the database is stored in the form of key-value a pair and will be stored in the database (MongoDB) in the key-value pair. as the database used is a non-relational database which is, hosted in the cloud, due to, which the data is stored in distributed system which will help in easy access of the data, as it is cloud-based it is easy to maintain the backup of data.

step[6]As in every successful process from the generation of the Quick Response(QR) code to scanning and marking the attendance with the help of the Quick Response(QR) code, all the data retrieved is stored in the documents of the database. As a result of which, whenever the teacher requires the data of all students, then teachers will easily get access to the data and can implement the necessary reports such as access to weekly, monthly, and overall attendance records of the students that can be on the required amount of data as needed. similarly, the students will be having the access to individual data about the lectures they have attended during a particular amount of time and be able to generate self-reports of their attendance using the data. Also, the data of students and teachers will be accessible to the admin. Admin has access to weekly, monthly, and overall attendance records of all students and teachers as well.

IV. CONCLUSION

In this modern era, every field is using the latest technology. After a pandemic, it is very important to be updated with the latest technology. The education system is no exception to that. In some situations, all teaching and learning are done virtually. In the current situation, the education system is open physically and in most colleges attendance is monitored by using the traditional way of using pen paper or by calling the name of the student or passing the sheets to the student to mark the time-consuming attendance. Due to this practice or this method, the precious time of both student teacher is wasted. As well as there are chances of marking proxy or fake attendance of students who are not present in class. A solution to this problem can be obtained by using modern technology i.e Quick Response(QR) systems. Using this technology is an emerging technology is and used in many areas. with Quick Response(QR) Teachers can generate and provide the Quick Response(QR) code to the students. students should scan that Quick Response(QR) code for marking their attendance by using their smartphone or other devices using the internet by accessing the location and name of the college we can decrease the risk of false attendance or proxy of students. By using this method, we can save more time as compared

REFERENCES

- [1] J.S. Nalintipwong, T. Tasarika, C. Ruksomya, S. Vittayakorn and T. Numnonda, "Concurrent Self-Identification Applying QR Code to Record Class Attendance (QRClass)," 2019 IEEE 9th International Conference on Electronics Information and Emergency Communication (ICEIEC), 2019, pp. 1-5, doi: 10.1109/ICEIEC.2019.8784518.
- [2] L. Kamelia, E. A. D. Hamidi, W. Darmalaksana and A. Nugraha, "Real-Time Online Attendance System Based on Fingerprint and GPS in the Smartphone," 2018 4th International Conference on Wireless and Telematics (ICWT), 2018, pp. 1-4, doi: 10.1109/ICWT.2018.8527837.
- [3] S. Nalintipwong, T. Tasarika, C. Ruksomya, S. Vittayakorn and T. Numnonda, "Concurrent Self-Identification Applying QR Code to Record Class Attendance (QRClass)," 2019 IEEE 9th International Conference on Electronics Information and Emergency Communication (ICEIEC), 2019, pp. 1-5, doi: 10.1109/ICEIEC.2019.8784518.
- [4] Mishra, Shubham Kumar, Chandan Ali, Ahmad Bala, Jeevan. (2021). Online Attendance Monitoring System Using QR Code (OAMS). 379-384. 10.1109/ICIEM51511.2021.9445304.
- [5] A. Chomklin, L. N. Nongkhai and P. Padungpattanadis, "Class Attendance Recording using QR Code via Smartphone," 2019 4th International Conference on Information Technology (InCIT), 2019, pp. 173-178, doi: 10.1109/INCIT.2019.8912099.
- [6] A. Chomklin, L. N. Nongkhai and P. Padungpattanadis, "Class Attendance Recording using QR Code via Smartphone," 2019 4th International Conference on Information Technology (InCIT), 2019, pp. 173-178, doi: 10.1109/INCIT.2019.8912099.
- [7] A. Nuhi, A. Memeti, F. Imeri and B. Cico, "Smart Attendance System using QR Code," 2020 9th Mediterranean Conference on Embedded Computing (MECO), 2020, pp. 1-4, doi: 10.1109/MECO49872.2020.9134225.
- [8] N. Hermanto, Nurfaizah, W. M. Baihaqi and Sarmini, "Implementation of QR Code and Imei on Android and Web-Based Student Presence Systems," 2018 3rd International Conference on Information Technology, Information System and Electrical Engineering (ICITISEE), 2018, pp. 276-280, doi: 10.1109/ICITISEE.2018.8721009.
- [9] K. Navin, A. Shanthini and M. B. M. Krishnan, "A mobile based smart attendance system framework for tracking field personals using a novel QR code based technique," 2017 International Conference On Smart Technologies For Smart Nation (SmartTechCon), 2017, pp. 1540-1543, doi: 10.1109/SmartTechCon.2017.8358623.